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IN REPLY REFER TO
OPNAVINST 9010.337
OP-03C

28 AUG 1987

OPNAV INSTRUCTION 9010.337

From: Chief of Naval Operations

Subj: APPROVED TOP LEVEL REQUIREMENTS (TLR) FOR THE COASTAL HYDROGRAPHIC SURVEY SHIP (T-AGS 51)

Encl: (1) Coastal Hydrographic Survey Ship (T-AGS 51) Top Level Requirement

1. Purpose. To issue the approved Top Level Requirements for the Coastal Hydrographic Survey ship (T-AGS 51).

2. Applicability. These Top Level Requirements are applicable to the Coastal Hydrographic Survey (T-AGS 51) Class ship commencing with the FY-87 Shipbuilding and Conversion Program. These Top Level Requirements can be satisfied by either new ship construction or conversion of existing commercial vessels.

3. Changes. Changes to these Top Level Requirements must be kept to a minimum. Therefore, any change which would result in a costly and time consuming impact on the ship's construction schedule must be justified. Proposed changes to the military characteristics of this ship should be submitted to the Chairperson of the Ship Characteristics and Improvement Board for approval by the Chief of Naval Operations.

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Assistant Deputy Chief of Naval Operations
(Surface Warfare)

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COASTAL HYDROGRAPHIC SURVEY SHIP, T-AGS (51/52)

TOP LEVEL REQUIREMENTS

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1. OVERVIEW

1.1 Objectives and Scope

a. This document specifies the Top Level Requirements (TLR) for a Coastal Hydrographic Survey Ship, T-AGS (51/52), procurement which is planned for FY 87. Included are the ship's mission, operational requirements, major configuration constraints, the plan for use, the maintenance concepts, the supply support concepts and minimum operational standards.

b. The objective of the T-AGS (51/52) Ship Acquisition Program is to acquire two hydrographic survey ships capable of collecting and processing hydrographic data worldwide in depths from 10 to 600 meters. These ships must also be capable of surveying in deeper water.

c. The format of this TLR has been developed per OPNAVINST 9010.300A (NOTAL). The TLR documents ship requirements as they are developed and refined throughout the design phases of a ship acquisition program. After this TLR is issued, serialized changes will be made to issue any changes to these requirements.

1.2 Constraints

a. An Initial Operational Capability (IOC) of FY 90 is required. Congress has appropriated $35M for two ships.

b. If the provisions of this TLR cannot be met, the Commander Naval SEA Systems Command will so advise the Chief of Naval Operations (OP-006).

1.3 Design Guidance

a. The T-AGS (51/52) shall conform to commercial standards and shall comply with all the applicable laws of the United States and the requirements of the regulatory bodies including the American Bureau of Shipping (ABS), 46 CFR Subchapter U (Oceanographic Ships), and the Federal Communications Commission, in force at the time of award. The ship shall be classified by ABS to Al E(CIRCLED), AMS, and ACCU.

b. Design shall include emphasis on economy of operation. Compliance with the General Specifications for Ships of the U.S. Navy, NAVSEA Technical Manuals, or other military requirements, is not required except as noted herein.

2. MISSION STATEMENT

2.1 Mission. The mission of the Coastal Hydrographic Survey Ship, T-AGS (51/52), is to collect hydrographic data worldwide in harbors and coastal waters from 10 to 600 meters and in near-coastal waters at depths greater than 600 meters.

2.2 Primary Tasks. To carry out the mission, the T-AGS (51/52) shall be capable of performing the following tasks:

a. Collect and process hydrographic data in water depths to 600 meters using the shallow water echo sounder or the shallow water multibeam survey sonar.

b. Collect and process hydrographic data in water depths between 600 meters and 4000 meters using the deep water echo sounder.

c. Post process hydrographic data off-line to incorporate tide and sound velocity values.

d. Launch, recover and tow side scan sonar.

e. Analyze bottom samples in wet laboratory.

f. Provide precise navigation for hydrographic surveys.

g. Launch, recover, service and support two survey launches and the Rigid Inflatable Boat (RIB) including fueling.

2.3 Secondary Tasks. The T-AGS (51/52) has no wartime mission.

3. TOTAL SHIP REQUIREMENTS AND CHARACTERISTICS

3.1 Command, Control and Communications. Facilities shall be adequate for survey operations and shall include:

a. Ship handling and maneuverability to permit the launch and recovery of scientific packages, survey launches, and the RIB.

b. Manual and automatic steering control.

c. A ship control station with unobstructed view of the launch and recovery of the two survey launches. Bridge wings shall include gyro repeaters, rudder angle indicators and shaft RPM indicators. Satisfactory visibility from pilot house forward, and from open bridge wings forward and aft, are required. The functions, communications, and layout of ship control must allow the close interaction of ship and survey operations.

d. Communication, navigation, and IC systems are listed in Appendix A.

3.2 Acoustic Characteristics

a. Echo sounding systems shall be operated at frequencies of 12 kHz, 40 kHz, and at 200 kHz. Shallow water multibeam hydrographic sonar will be operated at 95 kHz. The towed sidescan sonar systems will operate at 105 kHz. Shallow water surveying shall be performed at depths of 10 to 600 meters at all speeds up to 12 knots. Deep water surveying shall be performed at depths to 4000 meters. Side scan sonar shall not be towed at speeds above 6 knots.

b. Mission work spaces shall be sound insulated to maximize communication within these spaces.

3.3 Survivability, Including Passive Protection

a. Survivability provisions shall be under regulatory body requirements.

b. All radiators and receptors of electromagnetic energy and related electronics on the T-AGS (51/52) shall be designed and installed to ensure electromagnetic compatibility (EMC) and to avoid hazards of electromagnetic radiation to personnel (HERP) and fuels (HERF). Automated control systems shall not respond spuriously to electromagnetic interference (EMI) from radiating sources or to transients on power lines.

c. The ship shall meet all applicable safety requirements of the regulatory bodies.

3.4 Mobility. A speed of about 14 knots (18 knots desired) at maximum continuous power (MCP) is required, with a sustained speed at 80 percent of MCP or 12 knots (16 knots desired). The ship shall have a fuel storage capacity to sustain the vessel for a range of 13,800 NM at sustained speed (which includes a 15 percent fuel reserve margin).

3.5 Operating Environment. The T-AGS (51/52) shall operate as required in unrestricted worldwide service, and perform its mission under a range of weather conditions including tropical conditions. Operation in ice is not a requirement.

3.5.1 Temperature and Humidity. Habitability areas shall be air conditioned and shall be designed for a maximum external air temperature of 95 degrees Fahrenheit dry bulb, 82 degrees Fahrenheit wet bulb, with a maximum sea water temperature of 85 degrees Fahrenheit, and a minimum external air temperature of 0 degrees Fahrenheit with a minimum seawater temperature of 28 degrees Fahrenheit. Heating and air conditioning for all mission work spaces shall be designed for a maximum external air temperature of 105 degrees Fahrenheit dry bulb, 87.5 degrees Fahrenheit wet bulb with a maximum seawater temperature of 95 degrees Fahrenheit and a minimum external air temperature of 0 degrees Fahrenheit with a minimum seawater temperature of 28 degrees Fahrenheit.

3.5.2 Wind and Sea Conditions

a. Safe transit of the T-AGS (51/52) at sustained speed is required.

b. The ability to launch and recover scientific equipment and boats while maintaining best heading, in seas up to 4 ft. significant wave height (Sea State 3), is required.

c. Provision for routine shallow water survey operations at 12 knots to 9 ft. significant wave height (Sea State 5) at any heading is required.

3.6 Ship Utilization. The T-AGS (51/52) will have an irregular deployment cycle. The T-AGS (51/52) is expected to average 250 days per year at sea. Mission duration is a minimum of 23 days on station at maximum range.

3.7 Maintenance, Overhaul and Supply Support Concepts.
Logistics Support

a. The T-AGS (51/52) shall be capable of 23 days of self-sufficiency for regular preventive and corrective maintenance.

b. The T-AGS (51/52) shall be capable of limited emergency repair of hull structure and engineering casualties. Repair task areas include:

(1) Limited repair of above-water hull structure.

(2) Minor steering system and/or shafting repair.

(3) Minor propulsion, auxiliaries and electrical repairs.

(4) Substantial repair of scientific deck machinery and electronics.

c. Day-only, hover-only helicopter capability by commercial helicopters shall be provided.

d. The maintenance and overhaul concept for the T-AGS (51/52) shall be consistent with commercial maintenance support in a foreign port using U.S. commercial sources of supply and maintenance. Support shall satisfy Navy policy on Integrated Logistics Support (SECNAVINST 5000.39A (NOTAL), OPNAVINST 5000.49A (NOTAL)).

e. Supply Support

(1) The T-AGS (51/52) shall carry consumables for accommodation of 33 as follows:

Dry Stores	90 days
Frozen	90 days
Chilled	45 days
Medical	120 days

(2) Separate stowage spaces shall be provided for deck, engine, medical, damage control, mission equipment and steward stores.

3.8 Manning and Habitability

3.8.1 Manning. Manning shall be constrained to the accommodations stated. The ship operating personnel shall be employees of the Military Sealift Command or contractor personnel.

3.8.2 Accommodations. The total berthing accommodations are as follows:

Single Stateroom:	8 Officer (all w/bath)
	1 Scientist (with bath,
	9 Staterooms

Double Stateroom:	6 Crew (Semi-private Toilet/Shower)
	6 Scientist/Technician (Semi-private Toilet/Shower)
	12 Staterooms

3.8.3 Habitability Standards. Quarters for scientific personnel shall be comparable to those provided for ship's personnel. The messing facilities shall include space for lounge, recreation and training. A hospital space and self-service laundry facilities are required.

3.9 Flexibility for Change, Including Weight Reservations

a. Service life allowance of five percent of full load displacement and 0.5 foot of metacentic height (KG) shall be provided.

4. SUBSYSTEM REQUIREMENTS AND CHARACTERISTICS

4.1 Hull Form and Structure. Not applicable.

4.2 Propulsion System. The following specific capabilities and characteristics are required:

a. The prime movers shall be diesel engines, using marine diesel fuel.

b. The ship shall be capable of maintaining a survey and speed between 4 and 6 knots for towing operations and between 9 and 12 knots for other survey operations.

c. Economy of operation shall be considered during the design.

d. The machinery spaces shall be designed for unattended operation. A central machinery control space in the machinery room shall be provided for operation and monitoring of propulsion and auxiliary machinery and systems.

e. The primary ship control system, located in the pilot house, shall permit control of main engine speed and direction.

4.3 Electric Plant. Mission power demand shall include: Clean power (Table 19, ANSI/IEEE Std. 446-1980) for mission work space, 40 va per sq. ft., not to exceed 30 Kilowatts total.

4.4 Command, Surveillance, and Scientific Mission Requirements

a. Appendix B provides a list of Mission Sponsor Equipment. Selected hydrographic data collection systems shall be provided with uninterruptible power for 15 minutes.

b. The following mission facilities shall be provided and, where practical, are to be located contiguous to one another in the area of the ship which experiences the least motion in a seaway.

(1) Deck - Working Area: 1500 sq ft minimum total main deck working deck area to accommodate launching, recovery and stowage of sounding launches and other equipment. All hatches on the working deck shall be flush type hatches.

(2) Mission Work Spaces: A minimum of 700 sq ft of mission work space for the survey control center and wet laboratory shall be located contiguous to the main deck.

(3) Scientific Storage: Environmentally controlled storage with a total of 2000 cu ft accessible to mission work space. Stowage shall not open to the weather.

(4) Overside Handling. Handling gear to accommodate overside operations shall include the capability to carry, launch, and recover launches and overside equipment.

(5) Deck Equipment. Cranes and winches shall be provided to permit loading and unloading the ship and to support survey operations at sea.

c. Two Global Positioning System (GPS) receivers (primary and spare) and short range navigation system shall be provided.

4.5 Auxiliary Systems

a. The following specific capabilities and characteristics are required:

(1) Fresh water making capacity shall consist of a minimum of two units, capable of providing in excess of 60 gallons per day per accommodation. Stowage for not less than 120 gallons of potable water per person shall be provided. An additional 10 percent capacity and storage shall be provided for laboratory use. Automatic halogenation of potable water is required.

(2) A clean ballast system shall be provided. Dirty ballast shall not be permitted in any loading condition. Liquid ballast operations shall avoid partially full tanks in any hydrophone area.

b. The pollution emanating from the ship shall be limited. A shipboard sewage system, including transfer system, marine sanitation device, and holding tank with 24 hour capacity shall be installed.

c. The stack shall be arranged to minimize airborne pollution of the shipboard environment.

4.6 Outfit and Furnishings. Shall follow U. S. Coast Guard requirements, and commercial standards. Outfitting documentation shall satisfy Navy policy on Integrated Logistic Support. The vessel shall not be fitted with Chemical, Biological, Radiation Decontamination (CBR-D) facilities.

4.7 Armament. Not Applicable.

APPENDIX A

SHIP'S COMMUNICATION, NAVIGATION AND IC SYSTEMS

1. Infrared Facilities

   None

2. Transmitting/Transceiving Facilities

   a. (1) 1.6-30 mHz LSB, USB, (AME A3A); CW, FSK (125W PEP)
   b. (1) 2-23 mHz, AM, USB, CW, RTTY, 1 Kw
   c. (2) 156-158 mHz F3 (25 Watts)
   d. (1) 1.5-1.6 gHz INMARSAT
   e. (1) Secure Communications (KL51 Type)
   f. (1) 225-400 mHz (A3) 20 Watts

3. Receiving Facilities

   a. (2) 10 kHz - 30 mHz All Emissions
   b. (1) Secure Communications (KL51 Type)

4. Terminal Facilities

   None

5. Radar Facilities

   a. (1) 10 cm Surface Search Radar
   b. (1) 3 cm Surface Search Radar
   c. (1) Collision Avoidance System

6. Sonar Facilities (See also Appendix B)

   a. (1) Deep Depth Echo Sounder with Record Capability (Navigation)
   b. (1) Shallow Depth Echo Sounder with Flasher (Navigation)
   c. (1) Doppler Speed Log (Dual Axis)

7. Countermeasure Facilities

   None

8. Navigational Facilities

a. (2) Gyrocompass (MK 37)
b. (1) SATNAV (GPS and Transit Capability)
c. (1) Loran C
d. (1) Automatic Radio Direction Finder

9. Radiac Facilities

None

10. Remote Station Facilities

a. Pilot House

(1) Radar Display/Control of 10 cm Radar (16 inch)
(1) Radar Display/Control of 3 cm Radar (16 inch)
(1) Control of Collision Avoidance System
(1) Shallow Depth Echo Sounder Control and Display
(1) Anemometer Readout
(1) Remote display from Doppler Speed Log

b. Chart Room

(1) Display/Control of Deep Depth Echo Sounder
(1) Display/Control of Doppler Speed Log
(1) Display/Control of Automatic Radio Direction Finder
(1) Control/Display of Weather Facsimile
(1) Control/Display of Loran C
(1) Control/Display of SATNAV
(1) Anemometer Readout

c. Communication Room

(1) Control of Radio Facilities
(1) INMARSAT Master Terminal

d. Survey Control Center

(1) Remote Display from Ship's Doppler Speed Log
(1) Gyro Repeater
(1) Anemometer Readout
(1) Remote INMARSAT Terminal
(1) Shaft Speed and Direction Indicator
(1) Rudder Angle Indicator

11. Meteorological Facilities

a. (1) Weather Facsimile Converter/Recorder
b. (2) Wind Direction Equipment (Anemometers) with Readouts
(Pilot House, Chart Room, Survey Control Center)

12. Supplementary Facilities

Not Applicable

13. Special Facilities

a. (1) Lifeboat Radio
b. (2) EPIRB
c. (1) SOLAS Emergency Watch Receiver (2182 kHz)

14. IC Facilities

Intercom telephone system serving all operating spaces, mission work spaces, public spaces and working deck stations.

APPENDIX B

MISSION SPONSOR EQUIPMENT
T-AGS (51/52)

1. SHIP SYSTEM

A. HYSTAR (Collection) System — 1 Each

1. COMSTAR Surveyor CPU Model S-100A w/Keyboard
2. COMSTAR Helsman's Display S-100H
3. HEWLETT-PACKARD Graphics Display Screen HP2397A w/Controller and TPU
4. HEWLETT-PACKARD Printer HP2225D
5. HEWLETT-PACKARD Plotter HP7475A

B. HYSTAR (Processing) System — 1 Each

1. COMSTAR Surveyor CPU Model S-100A/ w/Keyboard
2. COMSTAR Helsman's Display S-100H
3. HEWLETT-PACKARD Graphics Display Screen HP2397A w/Controller and TPU
4. HEWLETT-PACKARD Printer HP2225D
5. HEWLETT-PACKARD Plotter HP7475A

C. GPS Receivers (Interfaced to HYSTAR) — 2 Each

D. Shallow Water Echo Sounders — 2 Each

1. ODOM EchoTrac DF3200 w/40 & 200 kHz Tranducers

E. Deep Water Echo Sounder — 2 Each

1. Line Scan Recorder, LSR1811
2. Precision Depth Digitizer, PDD200
3. Correlation Echo Sounder/Processor, CESPIII
4. Transmitter/Receiver, PTR105
5. Transducer, 12kHz, Massa TR73A

F. Side Scan Sonar — 2 Each

1. EG&G Model 260

G. Sound Velocimeter, (Over-the-Side) 2 Each

1. Applied Microsystems Sound Velocimeter SVP-16
2. Radio Shack Terminal TS-80
3. TTX Thermal Printer Model 1280

H. Power Conditioner - Pacific Power Source, G Series 30Kva with current compensation 1 Each

I. Universal Power Disturbance Analyzer DRANETZ Series 626 with 30 monitor and RS 232 port 1 Each

J. Shallow Water Multibeam Survey System 1 Each

1. SIMRAD, Data Collection and Post Processing System or equivalent

K. Short Range Navigation System

1. RACAL Microfix System

Control Measurement Unit 90600	2 Each
Microwave Transponder (Transmitter/Receiver) 90601	6 Each
Sector Antenna	4 Each
Omni - Directional Antenna	2 Each

L. Spares and Documentation 1 Each

II. LAUNCH SURVEY SYSTEM (per Boat)

A. HYSTAR (Collection) System 1 Each

1. COMSTAR Surveyor CPU Model S-100A w/Keyboard
2. COMSTAR Helsman's Display S-100H
3. HEWLETT-PACKARD Graphics Display Screen HP2397A w/Controller and TPU
4. HEWLETT-PACKARD Printer HP2225D
5. HEWLETT-PACKARD Plotter HP7475A

B. GPS Receivers (Interfaced to HYSTAR) 1 Each

C. Shallow Water Echo Sounders 1 Each

1. ODOM EchoTrac DF3200 w/40 & 200 kHz Tranducers

D. Inverter, Solid State 28VDC-115VAC Avionics Model 2A1000-1G — 2 Each

E. Battery Charger, 30 Amp with eight 100 Amp-hour batteries

F. Equipment Rack — 1 Each

G. Radio, High Frequency Single Side Band Mobile Motorola MICOM-S Model DSOMLA1N00-K — 4 Each

H. Spares and Documentation — 1 Each

I. Short Range Navigation System

1. RACAL Microfix System
   Control Measurement Unit 90600 — 1 Each
   Microwave Transponder (Transmitter/Receiver) 90601 — 1 Each
   Omni-Directional Antenna — 1 Each

J. Side Scan Sonar, Model EG&G260 — 1 Each

K. Sound Velocimeter, (Over-the-Side) — 1 Each

1. Applied Microsystems Sound Velocimeter SVP-16
2. Radio Shack Terminal TS-80
3. TTX Thermal Printer Model 1280

L. Power Supply — 1 Each

1. Lambda Power Supply LNS-P28 (GPS)
2. Lambda Power Supply LME-28 (Shallow water Echo Sounder)
3. Lambda Power Supply LNS-P24 (Short or Medium Range Navigation System)

III. GENERAL PURPOSE ELECTRONIC TEST EQUIPMENT (Ship & Boats)

A. Attenautor, Step, 28480, 355C 9N5985-00-993-1377 — 1 Each

B. Bridge, RLC, 11837, 250DE+1325 7Z6625-00-404-1592 — 1 Each

C. Capacitor, Decade, 24655, 1412-9410 1H6625-00-465-6861 — 1 Each

D.	Counter, Electronic, 28480, 5328A-H99 7Z6625-01-134-9994	3 Each
E.	Multimeter, Analog, VOM, 55026, 260-6HP 1H6625-01-021-0236	3 Each
F.	Multimeter, Digital, Fluke, 8060	3 Each
G.	Multimeter, Digital, 89536-8600A-01 7Z6625-01-031-0708	3 Each
H.	Ohmmeter, Mega, 24655, 1863-9700 7Z6625-01-001-8600	3 Each
I.	Oscilloscope, 100 MHz, 80009, 2336YA 7Z6625-01-172-6119	2 Each
J.	Oscilloscope, 100 MHz, 28480, 1741A-H14 7Z6625-01-102-1465	2 Each
K.	Oscilloscope, 300 MHz, 80009, 2465+1107 7Z6625-01-197-7883	2 Each
L.	Power Supply, VDC, 28480, 6296A 1H6130-01-067-3773	1 Each
M.	Power Supply, VDC, 28480-6274B 9K6625-00-160-0827	1 Each
N.	Reflectometer, Time Domain, 8009, 1503-01-04 7Z6025-01-145-2801	1 Each
O.	Resistor, Decade, 24655, 1433-9724 1H6625-00-031-3521	1 Each
P.	Oscillator, Audio, 28480, 200CD 7Z6625-00-518-4659	1 Each
Q.	Generator, Signal, Radio Freq. 28480, 8640B-001-031-7Z6625-01-018-8583	1 Each
R.	Power Conditioner, Dranetz, 626-PA-6003-1	
S.	Z Meter, LC, Semcore, LC53, 7Z6625-LL-HHZ-6269	1 Each

T.	Wattermeter, Bird, 43, 6625-00-649-5070	2 Each
U.	Dummyload, Bird, 8135, 1H6625-00-773-7311	2 Each
V.	Meter, Modulation, 21793, 9009N, 7Z6625-01-093-7831	1 Each
W.	RS-232 Break-Out Box, NAVTEL DC2II	1 Each
X.	Auto Transformer, Variac, Gerrad, W5MT3 1H5950-00-987-5601	1 Each

IV. MISCELLANEOUS ITEMS

A.	Light Table	1 Each
B.	Work Bench (2ft X 3ft)	5 Each
C.	Spare Parts Locker	1 Each
D.	Equipment Storage	2 Each
E.	File Cabinet	2 Each
F.	Office Equipment (Desk, Files, Copier, Etc.)	1 Each
G.	Zenith 248 Computer System w/Printer	1 Each
H.	Electrical Grade vinyl safety sheeting in mission work spaces, and radio room.	
I.	Chairs, Adjustable, Swivel	4 Each
J.	Stools, Drafting	8 Each
K.	Magna Lamps for Workbench	2 Each
L.	Soldering Stations	2 Each
M.	Electronics Tool Boxes	3 Each
N.	Drafting Table	1 Each
O.	Bookcase	3 Each